RENKUS-HEINZ

VARIAi

MODULAR INSTALLATION ARRAYS

VA101i-7 & VAX101i-7
VA101i-15 & VAX101i-15
VA101i-22 & VAX101i-22
VA101i-22/75A & VAX101i-22/75A
VA15Si & VAX15Si Subwoofer

Users Manual

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Introduction To VARIAi

The VARIAi loudspeaker family includes 3 full-range array modules and a 15 inch subwoofer. All have been designed to offer the ultimate in versatility and performance.

The VA / VAX101i-7 long throw module features a closely controlled 7.5 degree vertical dispersion ideal for long throw applications. It is most commonly used at the top of high power vertical arrays.

The VA / VAX101i-15 with 15 degrees of vertical coverage is a medium throw module and is most often used in the center of vertical arrays or in stand alone systems.

The VA / VAX101i-22 has 22.5 degrees of vertical coverage and is the most versatile of the array modules. In vertical arrays it is used at the bottom of the array to provide near field coverage, Stood upright and mated with other modules, it becomes a compact but powerful horizontal array.

All 3 models offer a wide range of horizontal coverage options. A 90º waveguide is standard but 60º and 120º are also available along with revolutionary 60º to 90º and 120º to 90º transitional waveguides. The transitional waveguides produce a trapezoidal coverage pattern ideally suited for many square and rectangular rooms and often eliminate the need for additional side or down fill loudspeakers.

The VA / VAX15Si is a powerful 15 inch subwoofer that doubles as a base for floor standing systems or as a suspension platform for flown vertical arrays. VA/VAX15Si 15" subwoofers can be flown alongside, behind, or at the top of the array, depending on the requirements. Universal hardware allows for cardioid arrays to be assembled as and when the need arises. Simply flip one or more subs within
the array and adjust the onboard DSP to provide a highly directional low frequency array.

VARIAi loudspeakers may be self powered with a powerful built-in bi-amplifier equipped with RHAON digital signal processing, control and supervision or they may be passive, including a passive crossover, for use with external amplification.

The VARIAi approach is based on the use of 3 different shape cabinets, each having a vertical coverage pattern that is complementary to the cabinet shape. Thus, the VA/VAX101i-7 has 7.5º sides and 7.5º vertical coverage. The -15 modules have 15º sides with 15º coverage and the -22 modules have 22.5º sides with 22.5º coverage. The closely controlled vertical coverage allows the output of modules in tight packed vertical arrays to sum coherently; thus three 15º modules provide 45º of vertical coverage, just as two 22.5 modules provide 45º of vertical coverage.

Adaptive Directivity - Ultimate Control

Vertical Control

3 Cabinet Angles for Vertical Control

7.5° • 15° • 22.5°

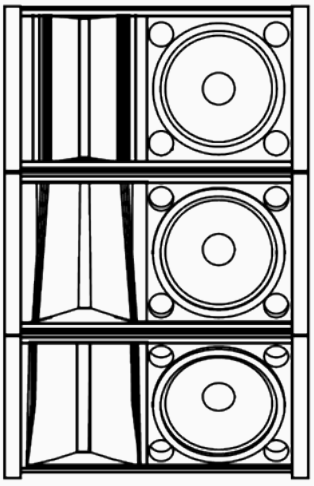
5 Waveguide Options for Horizontal Control

60° • 90° • 120°
Standard Waveguides

60° to 90° • 90° to 120°
Transitional Waveguides

3 System Configurations

Vertical Modular Point Source Array
Horizontal Modular Point Source Array
Modular Line Array System



Horizontal Control

The VARIAi Hardware

The array modules include an internal steel rigging infrastructure designed for safe, easy and clean looking installations in venues of any size or complexity. Note: Add 4 lbs. to each enclosure for the rigging connectors (6 lbs. for the SUB Connector).

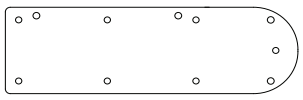
Enclosure Types:

7° enclosure	73 lbs
15° enclosure	72 lbs
22° enclosure	63 lbs
15S subwoofer	120 lbs

Depending on the room requirement, VARIA can be formed into two distinct types of arrays. The first is a line array. This can be spiral, J, straight, arc, etc. The second type of array is what we call Modular Point Source (MPS). This is distinctly different from a line array and allows one to literally build a custom loudspeaker to match the room. Using combinations of the VA101i-7 enclosure, with five choices of horizontal coverage angles, VARIA offers exceptional vertical coverage precision while allowing the horizontal coverage to be shaped as well.

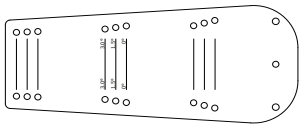
Rigging Connectors:

RHANG-VA101i	Flying Frame for VARIAi Arrays
RHANG-VA101iH	Hardware for VARIAi Horizontal Arrays - Use one kit for 2 wide array, two kits for 3, 4 & 5 wide
VA101i-CN-MPS	VARIAi Modular Point Source Cabinet Connector Kit for tight pack - Supplied with each cabinet
VA101i-CN-M1	VA101i-7 Cabinet Connector Kit for 3°, 4.5° and 6° intercabinet angles
VA101i-CN-M2	VA101i-7 Cabinet Connector Kit for 0°, 1.5° and 3° intercabinet angles
VA101i-CN-RPK	VARIAi Rear Pick Bar - For applications requiring additional pull back
WE0004	M10 eyebolts

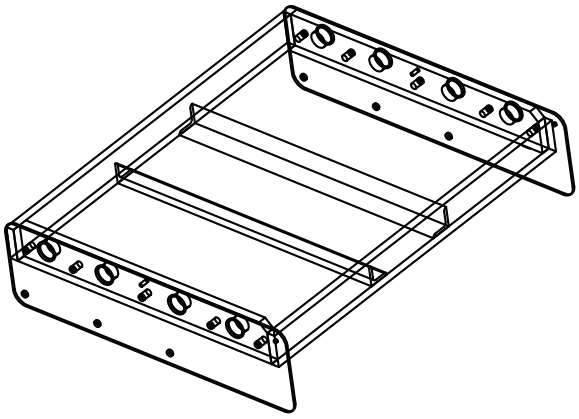


VA101i-CN-MPS

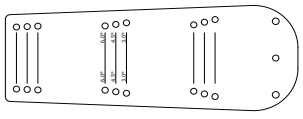
M2 (0°, 1.5°, 3°)



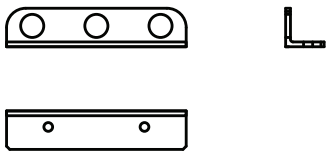
VA101i-CN-M2

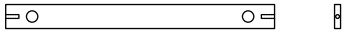


M1 (3°, 4.5°, 6°)



VA101i-CN-M1





VA101i-CN-RPK

VARIAi arrays are easy to assemble and require very few parts and associated tools. All user hardware are M8 bolts. Simple arrays can be assembled with no extra parts required as each enclosure comes with one set of connectors (MPS for 22's and 15's; SUB connector for VA15S; choice of MPS, M1, or M2 con-nector for 7's). All VARIAi hardware is constructed of 16ga. zinc plated 1008 steel which is then powder coated. Powder coated 304 Stainless Steel versions of all hardware are provided with the WR models. All versions come in black, white, or can be custom colored.

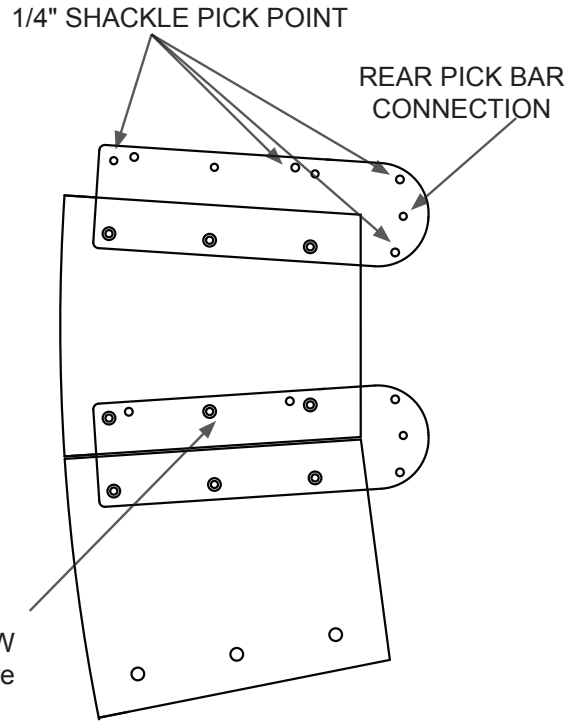
The hole patterns on each connector serve different purposes. Each MPS connector has six holes that are used strictly to connect enclosures together. The M1 and M2 multi-angle connectors have 18 holes (3 sets of six) that provide three different angle connections between 7° enclosures.

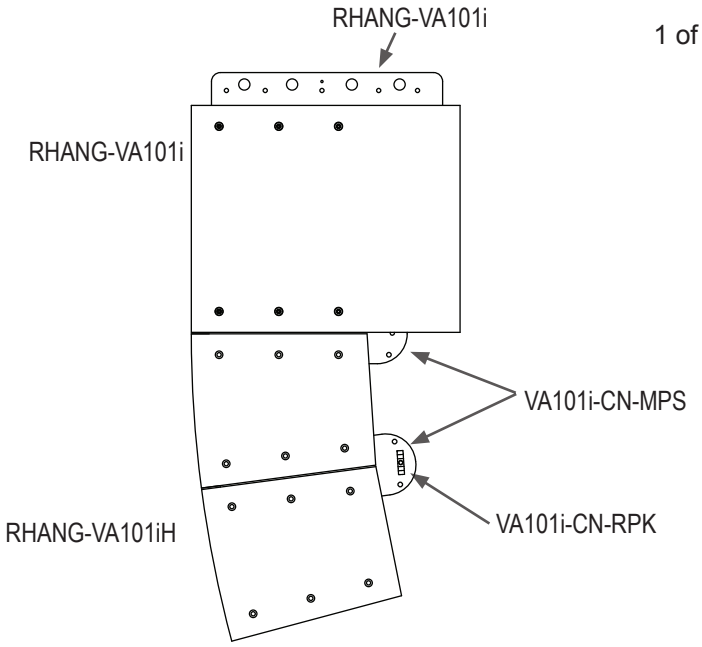
The diagrams below illustrate the design purpose of the remaining five holes. Four holes are used for direct connection to 1/4" shackles and suspension means for small arrays. The center rear hole is used to connect the REAR PICK BAR described later.

All VARIAi modules utilize the same basic internal structure which includes encapsulated steel plates within each side wall in a sandwich scheme. The inside steel plate includes captive locking PEM nuts that accept the M8 stainless steel screws provided. Each module includes 12 of these screw positions and this provides a framework for easy and safe arrays. Once configured, the array side walls become a steel superstructure.

Modules are connected to each other with connecting plates. The most common is the MPS CONNECTOR which creates a 'tight pack' connection from module to module and is the typical connection used in Modular Point Source arrays. The drawing to the right demonstrates this connection and 'reveals' - for purposes of explanation— the MPS CONNECTOR which is normally hidden.

Note: 15° and 22° modules only connect with the MPS CONNECTOR.





Warning:

The actual rigging of loudspeakers suspended from a truss or from a ceiling is a serious undertaking that is beyond the scope of this document. It should be done only by qualified and experienced professionals using only load rated hardware.

We strongly recommend that you have your design reviewed and approved by a licensed structural engineer who can also verify the suitability of the building attachment points.

Renkus-Heinz is not responsible for any non Renkus-Heinz products or for any misuse of Renkus-Heinz products.

Ground Stacked

Multiple full range array modules can be stacked on the ground or floor using one or more of the matching subwoofers as a base.

The array modules and the subwoofers are joined together using MPS, M1 or M2 connectors. Ground stacks of this type can handle up to 3 array modules and two subwoofers.

Note: 15° and 22° modules only connect with the MPS CONNECTOR.

Vertical Line Arrays

Most vertical line arrays are not assembled in a straight line as their name implies. Instead they are constructed in either a curved or a J shape or a combination of both shapes to obtain the proper sound coverage.

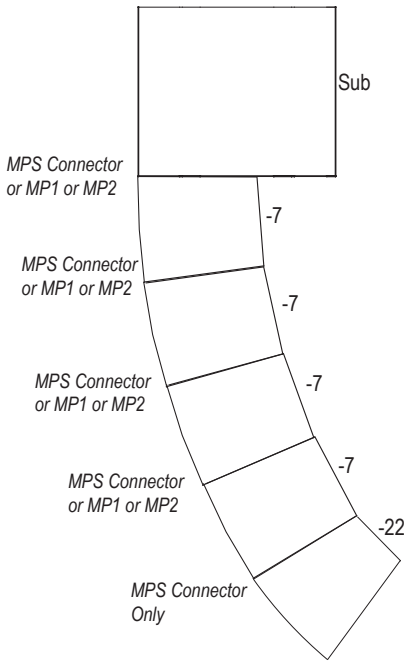
Since the shape of the array is typically determined by the flying hardware, the splay between the cabinets can be different than what is optimum from an acoustical standpoint.

The VARIAi approach is based on the use of 3 different shape cabinets each having a vertical coverage pattern that is complementary to the cabinet shape. Thus, the VA/VAX101i-7 has 7.5º sides and 7.5º vertical coverage. As a long throw cabinet, its normal position is at the top of a multi-cabinet array.

Subwoofers can also be used as a platform for flying the full range modules beneath them. Up to 6 full range modules and two subwoofers can easily and safely be flown in this fashion.

VARIAi also offers a choice of horizontal coverage patterns; 90º is standard, but 60º is offered for when the audience area is long and narrow and 120º for when a broader pattern is needed.

VARIAi also recognizes that in many cases a trapezoidal pattern is needed; one wider in the front of the room and narrower in the rear and offers waveguides that transition smoothly from 60º to 90º and from 90º to 120º.



This illustrations shows an example of how VARIAi modules can be flown in a vertical array for optimal horizontal coverage.

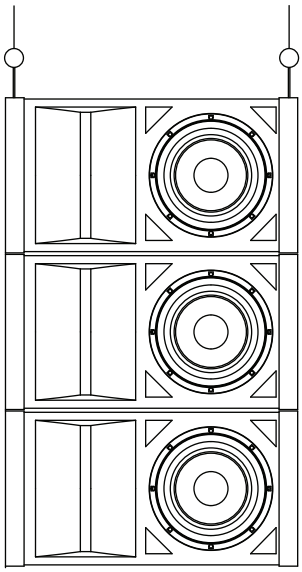
The modular point source nature of VARIAi lends itself to building custom coverage patterns to match room geometries. In this fashion, simple arrays such as the one shown below are straightforward. The MPS connector is the only connector needed and are provided with each loudspeaker.

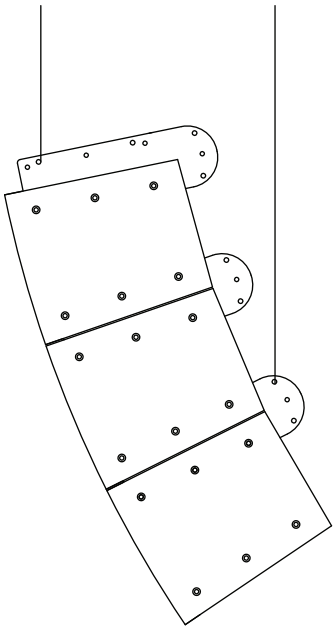
Each connector includes four 1/4" shackle pic points that can used to directly connect suspension hardware to the array.

This 'SHACKLE' mode has some limitations

1. No more than 5 enclosures.
2. Subwoofers are not included in the array.
3. No more than 150lbs loaded on any one shackle point.
4. Connectors can only accept pull forces in plane with the steel. No rotations or outward bridles.

NOTE: The RHANG frame does not have these limitations.

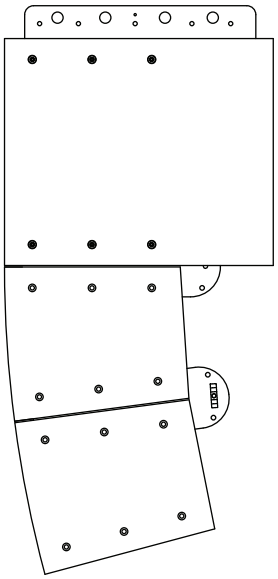




For larger arrays and where rigging requirements include bridles or odd angles, the RHANG frame is required. When utilized properly, arrays of up to 2000lbs can be assembled with both the standard and WR versions.

RHANG—The RHANG frame connects directly to any of the VARIAi enclosures in the same manner all other connectors (M8 bolts). Once connected, rigging hard-ware can be used to connect to any of the eight 15/16" holes in the frame. Us-ing four pic points, the frame is rated to safely suspend arrays of up to 24 enclosures.

REAR PICK BAR— In addition to the RHANG frame, for pull back conditions that require bridles or larger rigging hardware than 1/4" shackles, the REAR PICK bar is used and simply bolts into the center hole on each connector. The REAR PICK bar connects with M8 x 25mm bolts provided.



Horizontal Arrays

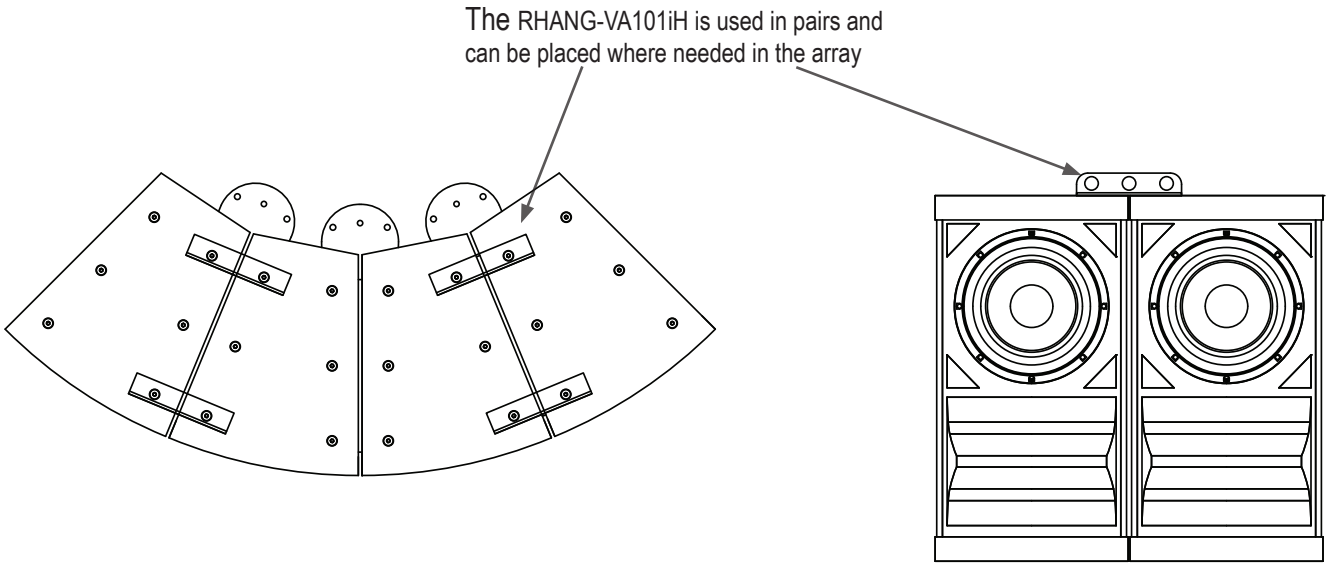
The complementary cabinet angles and tightly controlled dispersion that allow the sonic outputs of VARIAi array modules to be smoothly mixed to obtain the desired coverage perform just as well in horizontal arrays as they do in vertical line arrays.

Joining two VA101i-22 22.5º modules together in a horizontal array or cluster produces a seamless 45º horizontal pattern; use three 22.5º modules for 67.5º of horizontal coverage and 4 for 90º. Or use 6 VA101i-22 modules for 135º of horizontal coverage.

To assemble a horizontal array, stand the cabinets on end and connect them together using MPS connectors. The RHANG-VA101iH is used to provide easy rigging points on top of a horizontal array in any position. These come in sets of 2 along with the M8 x 45mm HEX bolts needed for installation and are added to the array in addition to the MPS connectors. The MPS connectors are installed as normal with the exception of the bolts. Install the RHANG-VA101iH on the outside of the enclosures using the provided bolts that will hold it, and MPS connector, in place.

Note that the RHANG-VA101iH hardware accommodates only the 22.5 degree VA / VAX101i-22 You should not attempt to use it with the other VARIAi modules.

For horizontal clusters,
If severe down angles are required, it is recommended to add the REAR PIC BARS as needed to provide this connection.

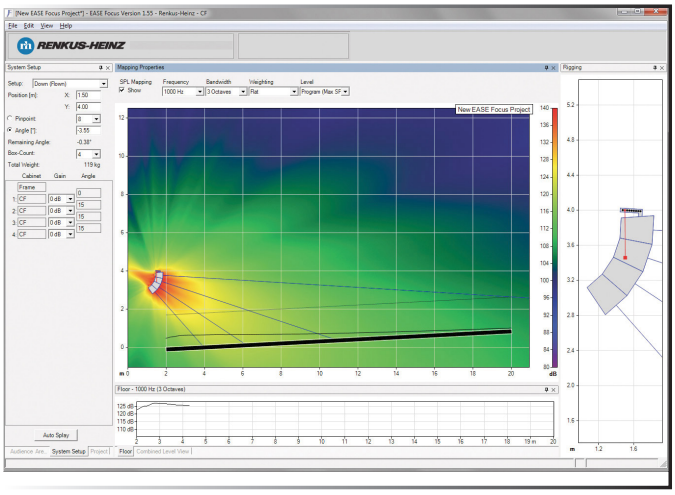


Software

EASE and EASE Focus II Simulation Software

Varia101 GLL data in EASE and EASE Focus II simulation software tools allows you and system designers to quickly and accurately predict the performance of individual Varia loudspeakers and of Varia arrays in various settings.

Simply define the audience areas, position the loudspeaker or array, add or remove cabinets and adjust its height, location and aiming angle until you achieve the desired results in the simulation. It is a lot easier and faster than doing it by the "cut and try" method in the field.



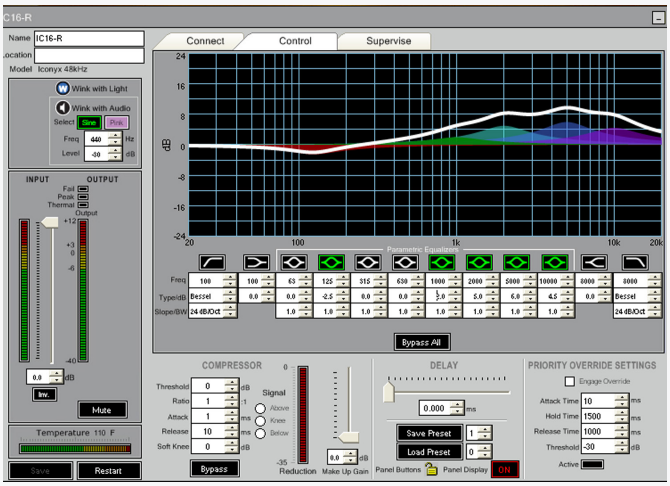
RHAON

All self-powered VARIAi loudspeakers are equipped with RHAON, the first practical system to combine individual loudspeaker control and supervision of self-powered loudspeaker systems with digital audio distribution. RHAON puts you in total control of:

– A powerful DSP inside each VARIAi loudspeaker that includes eight bands of parametric EQ, high and low frequency shelving filters, input level control, muting and up to 340 ms of delay.

– Monitoring of each loudspeaker's critical operating parameters such as signal clipping, amplifier output voltage and current and temperature with automatic alert functions.

– Real time digital audio distribution over standard Ethernet networks using proven CobraNet technology to deliver multiple channels of high quality digital audio over a CAT 5 cable.



Rear Panel Connections & Controls

VAX101i Connections

Screw Terminal Strip Inputs

Looping In & Out Neutrik 4-Pin Speakon Connectors

VAX101i modules require bi-amplification. An optional passive crossover network is available

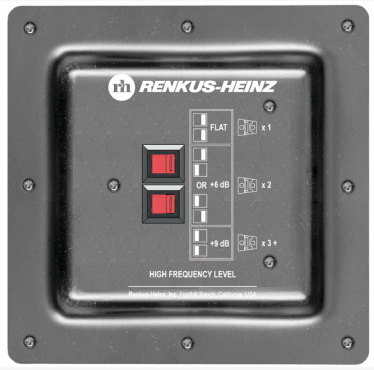
Optional Array Module High Frequency Control

Not all setups are identical and neither are all rooms. That is why the VAX101i series modules can include an optional rear mounted high frequency level control.

The high frequency level control allows you to adjust the high frequency output of each array module to compensate for:

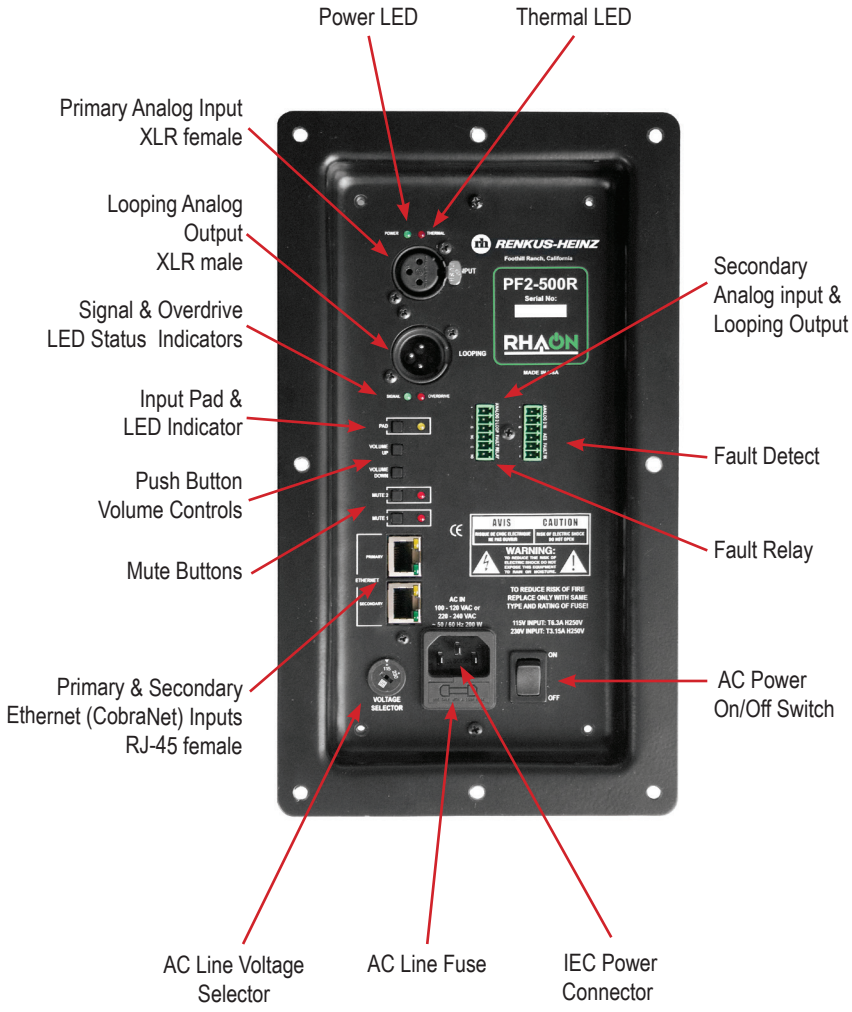
1. the increased loss of high frequency energy from air loss over distance
2. the increased coupling between array modules at low frequencies
3. different room sizes and acoustics

They allow you to maintain the proper High/Mid/Low frequency balance throughout the listening area. As a general rule use “Flat” when working with a single cabinet, plus 6 when using 2 cabinets in a small array and plus 9 in arrays having 3 or more cabinets.



Optional High Frequency Level Control

RHAON Empowered VARIAi Array Module Connections



The input panel shown is for the PF2-500R digital bi-amplifier used in the VA101i-7-52R

The PF1-500R single channel amplifier used with the VA / VAX15Si subwoofer input panel is identical except for having only 1 mute switch and status LED. For more detailed information, please refer to the Renkus-Heinz RHAON User's Manual.

VAX15Si subwoofers are shipped wired for fully passive operation using the internal crossover. The crossover can be bypassed by removing the connector plate from the cabinet and changing several internal connections. For detailed instructions, please refer to the Renkus-Heinz Loudspeaker User's Manual, form RH508.

DSP Settings

VAX101i-7 & VAX15Si DSP Settings

Suggested DSP settings for VAX101i-7 line array modules and their companion VAX15Si subwoofer combinations appear below.

Note that these would not apply to self-powered VA101i-7 modules with their built-in DSP.

VAX101i-7	WIRED AS BI-AMP			
	LF		HF	
AMP GAIN	0 dB		-11 dB	
OUTPUT DELAY	0.530mS		NONE	
POLARITY	NORMAL		NORMAL	
CROSSOVER				
CENTER FREQUENCY	60 Hz HP	1.6 kHz LP	1.7 kHz HP	NONE
TYPE	BUTTERWORTH	LINKWITZ-RILEY	LINKWITZ-RILEY	NONE
SLOPE	24 dB/ Oct	24 dB/ Oct	24 dB/ Oct	NONE
EQ #1				
CENTER FREQUENCY	125 Hz		1.5 kHz	
Bandwidth	0.4		.3	
BOOST/CUT	4.0 dB		3 dB	
EQ #2				
CENTER FREQUENCY	570 Hz		2.7 kHz	
Bandwidth	0.4		.3	
BOOST/CUT	-3.0 dB		-2 dB	
EQ #3				
CENTER FREQUENCY	1 kHz		4.5 kHz	
Bandwidth	0.4		.6	
BOOST/CUT	-4.0 dB		+2 dB	
EQ #4				
CENTER FREQUENCY	NONE		13 kHz	
Bandwidth	NONE		.7	
BOOST/CUT	NONE		+9 dB	

NOTES:

1. The EQ settings shown are for a single array module and may need “fine tuning” in multi cabinet arrays.

2. When the VAX101i-7 is being used with a VAX15Si subwoofer the VAX101i-7 should be delayed 2.7 ms.

VAX15Si		
AMP GAIN	0 dB	
OUTPUT DELAY	NONE	
POLARITY	NORMAL	
CROSSOVER		
CENTER FREQUENCY	40 Hz HP	80 Hz LP
TYPE	BUTTERWORTH	BUTTERWORTH
SLOPE	24 dB/ Oct	18 dB/ Oct

VAX101i-15 & VAX15Si DSP Settings

Suggested DSP settings for VAX101i-15 line array modules and their companion VAX15Si subwoofer combinations appear below.

Note that these would not apply to self-powered VA101i-15 modules with their built-in DSP.

VAX101i-15	WIRED AS BI-AMP			
	LF		HF	
AMP GAIN	0 dB		-11 dB	
OUTPUT DELAY	0.530mS		NONE	
POLARITY	NORMAL		NORMAL	
CROSSOVER				
CENTER FREQUENCY	60 Hz HP	1.7 kHz LP	1.7 kHz HP	NONE
TYPE	BUTTERWORTH	LINKWITZ-RILEY	LINKWITZ-RILEY	NONE
SLOPE	24 dB/ Oct	24 dB/ Oct	24 dB/ Oct	NONE
EQ #1				
CENTER FREQUENCY	125 Hz		1.7 kHz	
Bandwidth	0.4		.3	
BOOST/CUT	4.0 dB		3 dB	
EQ #2				
CENTER FREQUENCY	520 Hz		2.2 kHz	
Bandwidth	0.4		.250	
BOOST/CUT	-1.5 dB		-3 dB	
EQ #3				
CENTER FREQUENCY	1.1 kHz		3.2 kHz	
Bandwidth	.5		.7	
BOOST/CUT	-4.0 dB		-3.0 dB	
EQ #4				
CENTER FREQUENCY	1.8 kHz		13 kHz	
Bandwidth	.3		.7	
BOOST/CUT	2.0 dB		+9 dB	

NOTES:

1. The EQ settings shown are for a single array module and may need “fine tuning” in multi cabinet arrays.

2. When the VAX101i-15 is being used with a VAX15Si subwoofer the VAX101i-15 should be delayed 2.7 ms.

VAX15Si		
AMP GAIN	0 dB	
OUTPUT DELAY	NONE	
POLARITY	NORMAL	
CROSSOVER		
CENTER FREQUENCY	40 Hz HP	80 Hz LP
TYPE	BUTTERWORTH	BUTTERWORTH
SLOPE	24 dB/ Oct	18 dB/ Oct

VAX101-22 & VAX15S DSP Settings

Suggested DSP settings for VAX101-22 line array modules and their companion VAX15S subwoofer combinations appear below and on the next page.

Note that these would not apply to self-powered VA101-22 modules with their built-in DSP.

VAX101-22	WIRED AS BI-AMP			
	LF		HF	
AMP GAIN	0 dB		-7.5 dB	
OUTPUT DELAY	0.530mS		NONE	
POLARITY	NORMAL		NORMAL	
CROSSOVER				
CENTER FREQUENCY	60 Hz HP	1.7 kHz LP	1.6 kHz HP	NONE
TYPE	BUTTERWORTH	LINKWITZ-RILEY	LINKWITZ-RILEY	NONE
SLOPE	24 dB/ Oct	24 dB/ Oct	24 dB/ Oct	NONE
EQ #1				
CENTER FREQUENCY	125 Hz		1.7 kHz	
Bandwidth	0.4		.3	
BOOST/CUT	4.0 dB		4 dB	
EQ #2				
CENTER FREQUENCY	520 Hz		2.6 kHz	
Bandwidth	0.4		.4	
BOOST/CUT	-1.5 dB		-4 dB	
EQ #3				
CENTER FREQUENCY	1.1 kHz		4.7 kHz	
Bandwidth	.5		.35	
BOOST/CUT	-4.0 dB		-1.5 dB	
EQ #4				
CENTER FREQUENCY	1.8 kHz		13 kHz	
Bandwidth	.3		.7	
BOOST/CUT	2.0 dB		+9 dB	

NOTES:

1. The EQ settings shown are for a single array module and may need “fine tuning” in multi cabinet arrays.

2. When the VAX101-22 is being used with a VAX15S subwoofer the VAX101-22 should be delayed 2.7 ms.

VAX15Si		
AMP GAIN	0 dB	
OUTPUT DELAY	NONE	
POLARITY	NORMAL	
CROSSOVER		
CENTER FREQUENCY	40 Hz HP	80 Hz LP
TYPE	BUTTERWORTH	BUTTERWORTH
SLOPE	24 dB/ Oct	18 dB/ Oct

Model Number & Horizontal Coverage Cross Reference

VA101i-7 Series

VA101i-7/6-R: 60° H

VA101i-7/9-R: 90° H

VA101i-7/12-R: 120° H

VA101i-7/69-R: 60° to 90° H (Transitional)

VA101i-7/912-R: 90° to 120° H (Transitional)

VAX101i-7 Series

VAX101i-7/6: 60° H

VAX101i-7/9: 90° H

VAX101i-7/12: 120° H

VAX101i-7/69: 60° to 90° H (Transitional)

VAX101i-7/912: 90° to 120° H (Transitional)

VA101i-15 Series

VA101i-15/6-R: 60° H

VA101i-15/9-R: 90° H

VA101i-15/12-R: 120° H

VA101i-15/69-R: 60° to 90° H (Transitional)

VA101i-15/912-R: 90° to 120° H (Transitional)

VAX101i-15 Series

VAX101i-15/6: 60° H

VAX101i-15/9: 90° H

VAX101i-15/12: 120° H

VAX101i-15/69: 60° to 90° Hl (Transitional)

VAX101i-15/912: 90° to 120° H (Transitional)

VA101i-22 Series

VA101i-22/6-R: 60° H

VA101i-22/9-R: 90° H

VA101i-22/12-R: 120° H

VA101i-22/69-R: 60° to 90° H (Transitional)

VA101i-22/912-R: 90° to 120° H (Transitional)

VAX101i-22 Series

VAX101i-22/6: 60° H

VAX101i-22/9: 90° H

VAX101i-22/12: 120° H

VAX101i-22/69: 60° to 90° Hl (Transitional)

VAX101i-22/912: 90° to 120° H (Transitional)

IMPORTANT SAFETY INSTRUCTIONS

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Make sure the power cord remains readily accessible at all times.
12. Only use attachments/accessories specified by the manufacturer.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

Graphic Symbols

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "Dangerous Voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to humans.

The exclamation point, within an equilateral triangle is intended to alert the users to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

"WARNING - TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE"

"CAUTION: THESE SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED SERVICE PERSONNEL ONLY. TO REDUCE THE RISK OF ELECTRIC SHOCK DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN THE OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO".

VARIAi
MODULAR INSTALLATION ARRAYS

RENKUS-HEINZ

Renkus-Heinz, Inc., 19201 Cook Street, Foothill Ranch, CA 92610-3501, USA
Tel: 949-588-9997 • Fax: 949-588-9514 • sales@renkus-heinz.com
www.renkus-heinz.com

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